

## General information

### Oil pump

Most pumps used in steering applications are gear pumps.

Correct pump sizing is important in avoiding unnecessary energy consumption, or slow response to steering demand.

It is, therefore, extremely important to calculate the demand (number of revolutions) required by the steering wheel. If the same pump is to supply other auxiliary circuits, it is necessary to consider the following points:

- 1) if the auxiliary circuit is connected to the tank line, pressure must not exceed precisely determined values.
- 2) if the auxiliary circuit requires a constant flow, a LS unit must be used with an appropriately larger pump.

### Filtering

Filtration is recommended in the tank line to limit contamination as specified below:

Use the analysis system ISO 4406.

19/16 for LS and CN

20/17 for ON and OR

A magnetic insert is recommended when using filters larger than 25 micron.

### Steering cylinders

See system calculation and steering cylinders page 30/33.

### Tightening torques/threaded oil ports

Oil ports	Torque - Tolerance $\pm 10\%$							
	daNm				lbf in			
	Cutting edge		Copper washer		Aluminium washer		O-Ring	
G 1/4	4	354	2	177	3	265		
G 3/8	6	531	2	177	5	442		
G 1/2	10	885	3	265	8	708		
7/16 - 20 UNF	4	354	2	177	3	265	2	177
3/4 - 16 UNF	10	885	3	265	8	708	6	531
7/8 - 14 UNF	10	885	3	265	8	708	7	619
M 18 x 1.5	7	619	2	177	5	442	5	442

### Installation screws

Installation screws	Torque - Tolerance $\pm 10\%$	
	daNm	lbf in
M 10 x 1	6.5	575
M 10	3.0	265
M 8	3.0	265
3/8 - 16 UNC	2.5	221

## General information

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### Oil

We recommend the use of mineral based hydraulic oils containing antiwear additives. Preferred viscosity at an operating temperature of 50° C is 21 cSt. Viscosity must be in the range of 10÷1.000 cSt. Regular operating temperatures range from +30° C up to +60° C.

Maximum operating temperature is +90° C. Operating under such conditions reduces oil life considerably.

Minimum operating temperature is approximately -30° C.

Before using steering equipment at low temperatures, or with non flammable synthetic fluids, contact Ognibene's technical department.

The seals we install into standard hydrostatic steering systems are suitable for use with mineral based hydraulic oils.

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### Installation, starting and routine maintenance

Installation must be carried out in clean conditions where pipes are hot bent.

It is important to have all scale removed chemically. Ognibene recommends the use of metallic seals, such as copper or aluminium, for pipe fitting joints.

Cylinder ports must be fixed facing upwards, if this is not possible, venting ports must be provided in the upper part of the cylinders.

It is advisable to connect a gauge attachment point on the pressure line of the steering unit.

When using flexible hoses, prevent damage from movement under pressure by making sure all connections are tight, all venting ports open, and the tank filled. Make sure the above operations are carried out after careful cleaning.

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### Starting and venting

There should be no reaction torque on the steering linkage when starting system. (Lift the front axle or disconnect the steering cylinder from the steering wheels)

During the start-up operation, the pump must run slowly. Turn the steering wheel alternately from the right to the left stop, but don't hold the steering wheel in the extreme (stop) position for a long time.

As previously mentioned, the built-in-relief valve works as a by-pass thus diverting oil. The circuit will be completely vented when oil coming from the venting ports is free of air bubbles or air/oil emulsions.

It is recommended that the oil level is checked and topped during this operation.

Maximum temperature should not exceed 60° C, even under the most severe operating conditions. During the first 30 hours of operation, be sure to check oil level regularly, possible leaks in the circuit, and filter clogging.

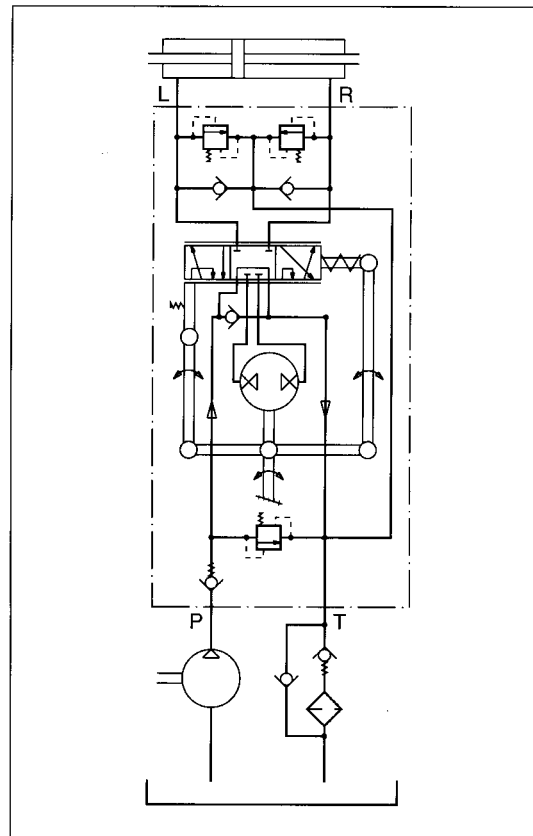
At the specified times, change the oil and the filter cartridge.

## Steering circuit examples

### Hydraulic circuit scheme with STA ON

This steering unit is equipped with:

- relief valve
- double anti-shock valve
- double anticavitation valve
- check valve

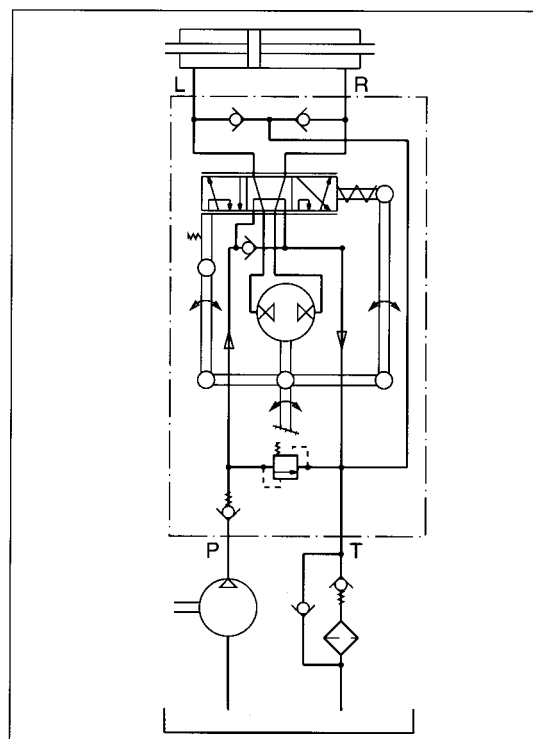


ISO SYMBOL

### Hydraulic circuit scheme with STZ OR

This steering unit is equipped with:

- relief valve
- double anticavitation valve
- check valve



ISO SYMBOL

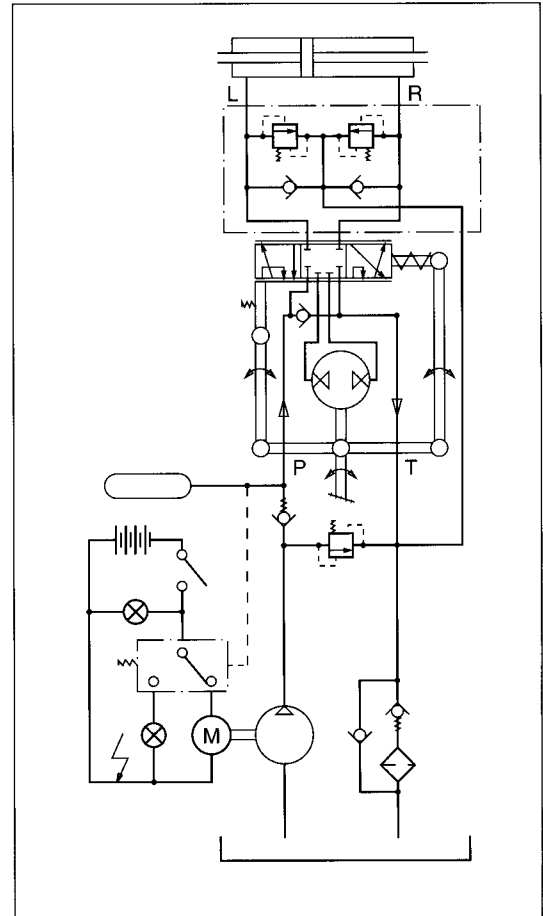
**Hydraulic circuit scheme with STX/MSTX CN**

This steering unit is equipped with:

- check valve

as seen at right, using this steering unit type, protection before the steering unit is necessary in order to prevent pressure peaks. The diagram indicates a possible solution using a pressostat connected to the pump.

OEM special versions are available on request.



ISO SYMBOL

Steering circuit examples

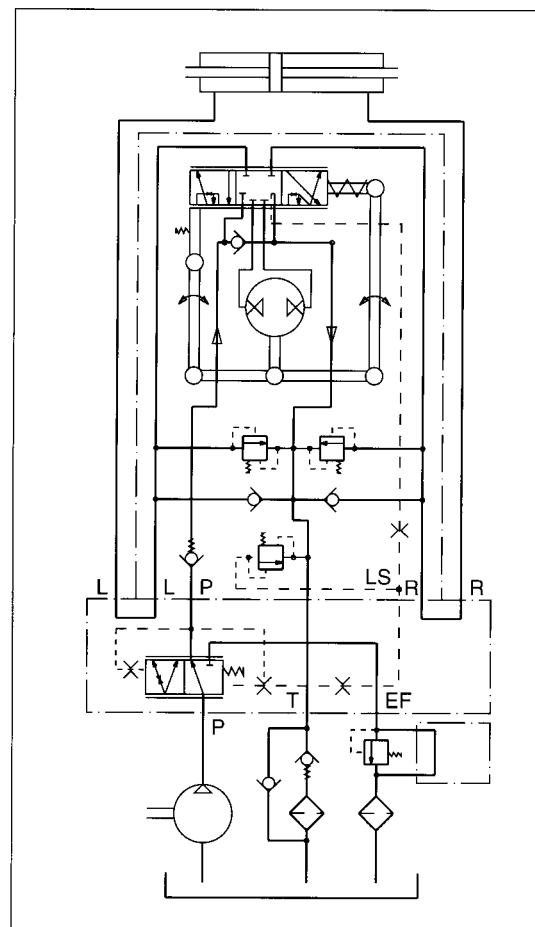
**Hydraulic circuit scheme with STA LS for VPF**

This steering unit is equipped with:

- relief valve
- double anti-shock valve
- double anticavitation valve
- check valve

In this circuit it is important to consider that the relief valve in the STA LS, is used only for steering unit protection.

All other componentry must, then, be protected from other adverse pressure conditions.



ISO SYMBOL

Steering circuit examples

**Hydraulic circuit scheme with STA LS for VPL**

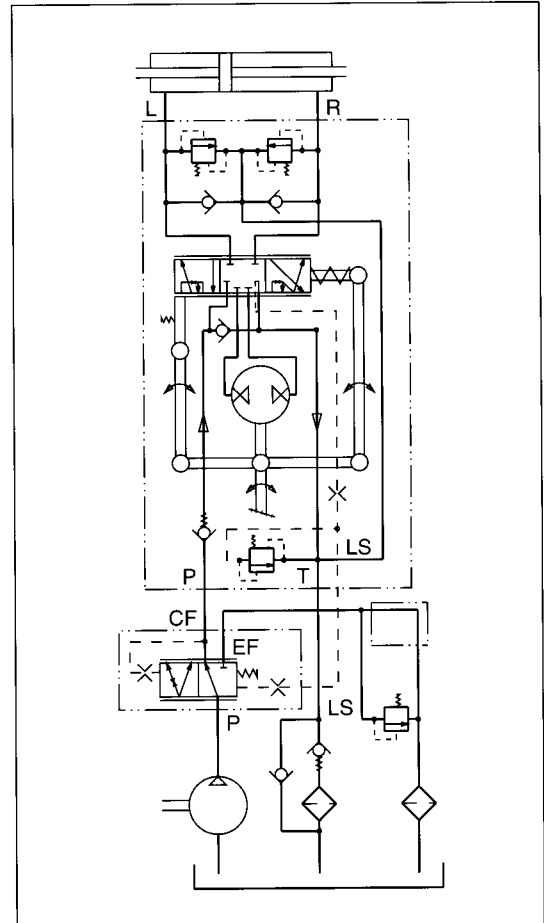
This steering unit is equipped with:

- relief valve
- double anti-shock valve
- double anticavitation valve
- check valve

In this circuit it is important to remember that the relief valve in the STA LS, is used only as steering unit protection.

All other componentry must then be protected from other adverse pressure conditions.

OEM special versions are available on request.



ISO SYMBOL